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PERFORMANCE TESTS FOR COMPLETE FILLED TRANSPORT PACKAGES

PART 11 TOPPLING TEST

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PERFORMANCE TESTS FOR COMPLETE FILLED TRANSPORT PACKAGES

PART 11 TOPPLING TEST

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Indian Standard

PERFORMANCE TESTS FOR COMPLETE FILLED TRANSPORT PACKAGES

PART 11 TOPPLING TEST

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 21 April 1986, after the draft finalized by the Transport Packages Sectional Committee had been approved by the Marine, Cargo Movement and Packaging Division Council.

0.2 Toppling test on complete filled transport packages may be carried out to investigate the performance of packages which are tall in relation to their base dimensions. It is also applicable to packages the height of which is small in comparison to their base dimensions but which may be stored or transported resting on a side face in order to conserve storage/transport space. It may be performed either as a single test to investigate the effects of toppling or as a part of a sequence of tests designed to measure the ability of the package to withstand a distribution system that includes a toppling hazard.

0.3 The test which is complementary to the tests described in Parts 3, 4 and 5 of this standard, namely, horizontal impact tests (horizontal or inclined plane test; pendulum test), a vertical impact drop test and rolling test respectively, may be used to investigate the performance of packages which are tall in relation to their base dimensions. The test may also be used where the dimensions of the package or the absence of necessary apparatus as per Parts 3 and 4 of this standard do not permit their use.

0.4 To achieve international co-ordination on the subject, this standard is based on the Draft International Standard ISO/DIS 8768 'Packaging — Complete, filled transport packages — Toppling test' issued by the International Organization for Standardization (ISO).

1. SCOPE

1.1 This standard (Part 11) specifies a method of carrying out a toppling test on a complete filled transport package which may be exposed to the danger of toppling during storage, transport and handling.

The test may be used to assess the performance of a package in terms of its strength or the protection that it offers to its contents when it is subjected to toppling.

1.1.1 The test is recommended for packages where the ratio of longest to shortest sides is of the order of 3 : 1 or more.

2. PRINCIPLE

2.1 In simple testing the package is placed on a flat horizontal surface and subjected to an increasing horizontal load applied at a position above its centre of gravity until it topples freely about a lower edge. The atmospheric conditions and package attitude are predetermined.

3. APPARATUS

3.1 Impact Surface — Horizontal and flat, massive enough to be immovable and rigid enough to be non-deformable under test conditions.

In normal circumstances, the impact surface provided shall be:

a) flat so that no two points on its surface differ in level by more than 2 mm;

b) rigid so that it will not be deformed by more than 0·1 mm when an area of 100 mm^2 is loaded statically with 10 kg anywhere on the surface; and

c) sufficiently large to ensure that the test package falls entirely upon the surface.

It shall have a mass at least 50 times that the of heaviest package to be tested.

NOTE — A concrete floor at least 150 mm thick is suitable provided it complies with the above requirements.

3.2 Means of Loading — Capable of applying a horizontal load to the vertical faces of the test package at a particular height above the centre of gravity and of sufficient force to cause toppling without causing the package to slide on the horizontal surface.

4. PACKAGE PREPARATION

4.1 The test package shall normally be filled with its intended contents. However, under certain circumstances, simulated or dummy contents may be used on condition that the dimensions and physical properties of such contents shall be as close as possible to those of the intended contents.

Ensure that the test package is closed normally, as if ready for distribution. If simulated or dummy contents are used, ensure that the normal method of closure is still employed.

5. CONDITIONING

5.1 The package shall be conditioned in accordance with one of the conditions described in IS : 7031-1973*.

6. PROCEDURE

6.0 Whenever possible the test shall be carried out in the same atmospheric conditions as used for conditioning, where this is critical to the materials or application of the package. In other circumstances, the test shall be carried out in atmospheric conditions which are as near as practicable to those used for conditioning.

6.1 Place the test package in the predetermined attitude (that is, standing on one of its smaller faces) on the impact surface (**3.1**).

6.2 Using the provided means of loading (**3.2**), apply increasing load to a vertical face above the centre of gravity (or at an upper edge) so that the package rotates about the opposite lower edge until a point of balance is reached. Then permit it to overbalance without thrust so that it falls freely onto the face opposite that of load application.

Note — For smaller packages, which can be handled manually, the toppling load may be applied by hand. For larger packages a mechanical means of loading may be necessary, that is, a hydraulic ram or a cable or winch.

6.3 Examine the package and record any external signs of damage.

6.4 Repeat the test with the package standing on or impacting on to other appropriate faces. In the case of a tall package the repeat tests shall be carried out with the package standing on its normal base and toppling on to each side face in turn (*see* Fig. 1). For flat packages (or a tall package where normal base is not defined) the tests shall be carried out with the package standing on each smaller face in turn and impacting on to each of the larger faces (*see* Fig. 2).

6.4.1 Tables 1 and 2 give appropriate sequences, for tall packages and flat packages respectively. (For the designation of the faces referred to in the tables *see* IS : 7030-1973†.)

6.5 On completion of the test sequence, open the package and examine the condition of the contents.

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*Method of conditioning of complete, filled transport packages.

†Method for identification of parts for complete filled transport packages.

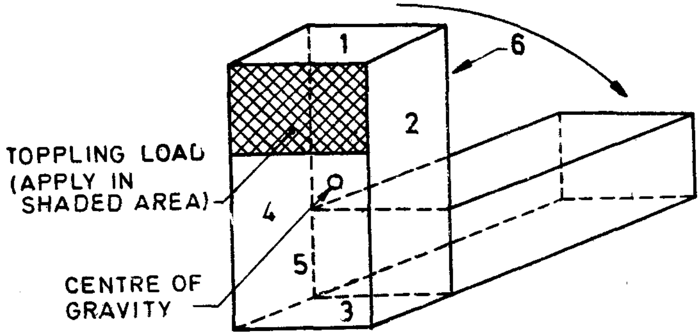

FIG. 1 TESTING OF TALL PACKAGES (THAT IS, WHERE HEIGHT IS LARGE COMPARED WITH BASE DIMENSIONS)

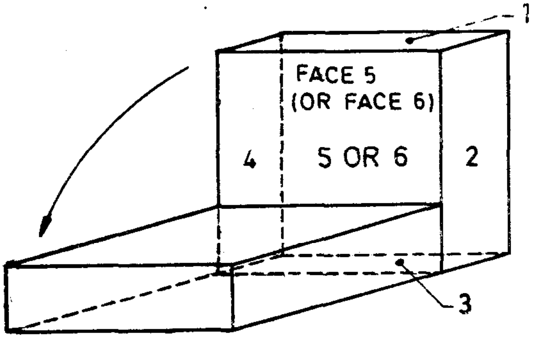

FIG. 2 TESTING OF FLAT PACKAGES (THAT IS, WHERE HEIGHT IS SMALL COMPARED WITH BASE DIMENSIONS AND PACKAGES MAY BE STORED OR TRANSPORTED RESTING ON A SIDE FACE)

TABLE 1 TEST SEQUENCE FOR TALL PACKAGES

(*Clause* 6.4.1)

STAND ON FACE	TILT OVER EDGE	TOPPLE ONTO FACE
3	3 – 6	6
3	3 – 5	5
3	3 – 2	2
3	3 – 4	4
1*	1 – 6*	6*
1*	1 – 5*	5*
1*	1 – 2*	2*
1*	1 – 4*	4*

*This part of the sequence is only applied where the normal base is not defined.

TABLE 2 TEST SEQUENCE FOR FLAT PACKAGES

(*Clause* 6.4.1)

STAND ON FACE	TILT OVER EDGE	TOPPLE ONTO FACE
1	1 – 5	5
2	2 – 5	5
3	3 – 5	5
4	4 – 5	5
1	1 – 6	6
2	2 — 6	6
3	3 – 6	6
4	4 – 6	6

7. TEST REPORT

7.1 The test report shall include the following particulars:

a) number of replicate packages tested;

b) full description, including dimensions, structural and material specifications of the package and its fittings, cushioning blocking, closure or reinforcing arrangements;

c) description of contents, if simulated or dummy contents were used and full details shall be given;

d) gross mass of the package, and net mass of contents in kilograms;

e) relatively humidity, temperatures and time of conditioning, temperature and relative humidity of test area; whether these values comply with the requirements of IS : 7031-1973*;

f) the sequence of attitude in which the package was tested, using the method of identification given in IS : 7031-1973*;

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*Method of conditioning of complete, filled transport packages.

g) type of loading apparatus used, maximum toppling force and height of the centre of applied load and if known, the height of the centre of gravity;
h) any deviations from the test method specified in this standard;
j) a record of the result, with any observations which may assist in correct interpretation;
k) date of the test; and
m) signature of tester.